35

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/769,841	01/24/2001	John William Locke	11859-005001	5512

24728 7590 10/12/2004

MORRIS MANNING & MARTIN LLP
1600 ATLANTA FINANCIAL CENTER
3343 PEACHTREE ROAD, NE
ATLANTA, GA 30326-1044

EXAMINER	
JARRETT, SCOTT L	

ART UNIT	PAPER NUMBER
3623	

DATE MAILED: 10/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/769,841	LOCKE, JOHN WILLIAM	
	Examiner	Art Unit	
	Scott L. Jarrett	3623	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 January 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because the coordinate labels (x, y axis) for Figure 1 and Figure 3 are missing and the coordinates labels for Figure 4 are illegible (x coordinate cut- off or missing; reads as y). Further it is suggested the applicant add labels to Figure 3 identifying the local and global minima calculated as disclosed in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 6 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite and failing to point out and distinctly claim the subject matter which the applicant regards as the invention.

The disclosure does not clearly define the phrase "managing" the cost of the business process. Calculating the cost of the business process more accurately describes the invention as claimed. The phrase "managing" implies a more concrete step, or method, or means by which the business process is acted upon as a result of the business process optimization calculations. For example the further step of passing and using the operational parameters calculated to a system monitoring and/or controlling the business process of interest thereby changing the state of execution (minimizing the cost of operations) of the business process would read as managing the cost of a business process.

3. Claims 4, 9 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite and failing to point out and distinctly claim the subject matter which the applicant regards as the invention.

The disclosure does not clearly define the term "slope". The slope at any given point on a multi-dimensional function can be defined with respect to any of the respective dimensions thereby making the term "slope" as claimed indefinite and vague.

It is old and well known in the art of Mathematics that the "slope" as claimed may possess a plurality of values for any given point of interest. One such example is a multi-dimensional graph representing a multivariant function having a saddle point (Applied Calculus, 2nd Edition Deborah Hughes-Hallett, et al., April 2002 – Chapter 5.1). Envision a saddle on a horse; it slopes down on the left and right sides of the saddle but slopes up on the opposing ends of the saddle and the middle (point of zero slope as claimed) is where one would sit. In this case however the point of zero slope has a local maximum in one direction (front end to back end) and a local minimum in the other direction (side to side) thereby making it indefinite whether or not the point of zero slope minimizes the cost function as claimed.

Claim Rejections - 35 USC § 101

4. Claims 6-10 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The basis of this rejection is set forth in a two-prong test of:

(1) whether the invention is within the technological arts; and

(2) whether the invention produces a useful, concrete, and tangible result.

For a claimed invention to be statutory, the claimed invention must be within the technological arts. Mere ideas in the abstract (i.e., abstract idea, law of nature, natural phenomena) that do not apply, involve, use, or advance the technological arts fail to promote the "progress of science and the useful arts" (i.e., the physical sciences as opposed to social sciences, for example) and therefore are found to be non-statutory

subject matter. For a process claim to pass muster, the recited process must somehow apply, involve, use, or advance the technological arts. In the present case, claims 6-10 only recite an abstract idea. The recited steps of merely calculating the minimal cost of a business process does not apply, involve, use, or advance the technological arts since all of the recited steps can be performed in the mind of the user or by use of a pencil and paper. These steps only constitute an idea of how to collect item information from a plurality of users.

As to technological arts recited in the preamble, mere recitation in the preamble (i.e., intended or field of use) or mere implication of employing a machine or article of manufacture to perform some or all of the recited steps does not confer statutory subject matter to an otherwise abstract idea unless there is positive recitation in the claim as a whole to breathe life and meaning into the preamble. In the present case, none of the recited steps are directed to anything in the technological arts as explained. Looking at the claims as a whole, nothing in the body of the claims recites any structure or functionality to suggest that a computer performs the recited steps. Therefore, the terms discussed are taken to merely recite a field of use and/or nominal recitation of technology.

Additionally, for a claimed invention to be statutory, the claimed invention must produce a useful, concrete, and tangible result. In the present case, the claimed invention minimizes the cost of a business process by means of minimizing the cost function associated with the business process being considered. The claimed

invention, as a whole, is not within the technological art as explained above claims 6-10 are deemed to be directed to non-statutory subject matter.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bayer et al., U.S. Patent 4,744,027 (May 1988), in view of Tucker et al., The Computer Science and Engineering Handbook (1996), and further in view of official notice.

7. Regarding Claim 1 Bayer et al. ('027) teaches a method and apparatus for managing the cost of a business process (apparatus and methods for optimizing processes to minimize cost or maximize benefits; Column 1, Lines 6-11).

Bayer et al. teaches a means for receiving a cost function (accepting; Figure 1, Element 200; Column 7, Lines 35-52) that describes the costs associated with the business process as a function of one or more operational parameters (parameters or variables; Column1, Lines 34-37 and 67; Column 2, Lines 1-7).

Bayer et al. teaches a means for finding the minimum cost point of the cost functions by iteratively computing the power series of the function, finding a

new/tentative state of the system and then evaluating the stopping criterion (see at least Figures 3-9; Column 4, Lines 37-55; Column 7, Lines 15-28).

Bayer et al. teaches a means for calculating the point of minimum cost for each section (facets or polytopes) using the Projective Scaling Method (see at least Column 6, Lines 3-26) and Affine Scaling Power Series Optimization Process (see at least Column 11, Lines 26-65; Column 10, Lines 21; Figures 4 and 5)

Bayer et al. teaches a means for selecting the point of minimum cost having the lowest value (stopping criterion; Figures 3 and 4; Column 9 Lines 22-34; Column 7, Lines 20-28).

Bayer et al. teaches a means for applying to the business process the operational parameters corresponding to the selected point of minimum cost (latest tentative state of the system; see at least Column 16, Lines 56-65).

Bayer et al. is silent on the continuity of the business process cost function received as claimed.

Bayer et al. does not teach means for dividing a discontinuous function into continuous sections as claimed.

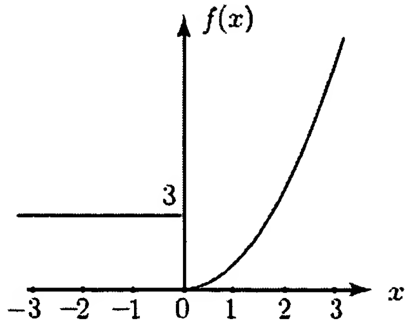
Regarding Claim 1 official notice is taken that the characterization and optimization of real-world systems using cost functions frequently results in cost functions being expressed as discontinuous functions in order to accurately reflect the

discontinuities found in these real-world business processes. Further such expressions are more intelligible and easier to solve for human and computers alike.

It would have been obvious to one skilled in the art at the time of the invention to use the apparatus and method for optimizing processes of Bayer et al. in view of official notice to provide for the optimization of a discontinuous cost function as claimed and benefit from the increased intelligibility and business process modeling accuracy. Additionally, it would have been obvious to one skilled in the art at the time of the invention that the apparatus and method for optimizing processes Bayer et al. was intended to optimize a number of complex cost functions including the discontinuous cost function as claimed.

Regarding Claim 1 Tucker et al. teaches a means for dividing a discontinuous function into continuous sections specifically the Divide-and-Conquer Algorithm wherein one decomposes a problem (function) into sub problems (sections) that resemble the original problem as a means for efficiently solving the original problem (Section 4.3 Divide-and-Conquer Algorithms, Page 73).

Further, it is old and well known in the art of Mathematics that when defining a discontinuous function algebraically it is often necessary to give different function rules for different values of x. Consider, for example, the discontinuous function defined and graphed below as $f(x)$. Notice that there is one continuous section (rule or function) for when x is less than zero and another rule for when x is greater than or equal to zero.



$$f(x) = \begin{cases} 3 & x < 0 \\ x^2 & x \geq 0 \end{cases}$$

The function $f(x)$ as defined above clearly demonstrates a means for dividing a discontinuous function into a set of continuous sections (functions) as claimed.

It would have been obvious to one skilled in the art at the time of the invention that the apparatus and method for optimizing processes of Bayer et al. would have benefited from the reduced calculation effort and time offered by the teachings of Tucker et al. as a direct result of the decomposition of the received discontinuous cost function into a set of continuous sections.

8. Regarding Claims 6 and 11, claims 6 and 11 recite similar limitations to Claim 1 and are therefore rejected using the same art and rationale as applied in the rejection of Claim 1.

9. Regarding Claim 2 Bayer et al. teaches the apparatus and method for optimizing processes as discussed above wherein the means for calculating the point of minimum cost for each section comprises a means for choosing a plurality of control points for each section whereby one chooses and successively evaluates a plurality of control

points (vertices) for each section (polytope) of the cost function each representing a potential minimum cost point (feasible solution; see at least Column 2, Lines 62-67 and Column 3, Lines 1-6).

Bayer et al. does not expressly teach a means for generating one of more approximations for each section based on the control points.

Tucker et al. teaches a means for generating one of more approximations for each section (function) based on the control points (Combinatorial Optimization, Chapter Approximation in Combinatorial Optimizations, Section 13.7, Paragraphs 1-3, Page 345) and further discloses approximation theory as a well established area of research and frequently used for optimization problems wherein a plurality of approximation means exists including linear programming and Lagrangian relaxation. The goal of such approximations is to efficiently find solutions that are close to the optimal solution (function) even though finding the optimal solution maybe hard (Section 13.7, Paragraph 2, Page 345).

It would have been obvious to one skilled in the art at the time of the invention that the apparatus and method for optimizing processes of Bayer et al. would have benefited from the approximation efficiencies offered by Tucker et al. More specifically it would have been obvious to one skilled in the art at the time of the invention to include in the apparatus and method for optimizing processes of Bayer et al. in view of the

teachings of Tucker et al. a means for calculating the point of minimum cost wherein calculating comprises choosing a plurality of control points for each section and generating one or more approximations based on the control points of each section as a means of efficiently determining the best approximation for the section's cost function and reducing the time and effort required to optimize the business process cost function (Tucker et al, Page 76).

10. Regarding Claims 7 and 12, claims 7 and 12 recite similar limitations to Claim 2 and are therefore rejected using the same art and rationale as applied in the rejection of Claim 2.

11. Regarding Claim 3 Bayer et al. ('027) teaches a method and apparatus for optimizing business processes and a means for finding the minimum cost point of the cost function as discussed above.

Bayer et al. ('027) does not teach a means for generating one or more approximations for each set of control points.

Tucker et al. does not expressly teach a means for generating one or more approximations for each set of control points. However, Tucker et al. teaches a means for generating one of more approximations for each section based on the control points as discussed above.

Regarding Claim 3 official notice is taken that a means for generating one or more approximations for each set of control points is a well known in the art of approximation theory and further a logical extension of the approximation theory disclosed by Tucker et al. The goal of such approximation efforts remaining the same; efficiently finding solutions (control point approximations) that are as close to the optimal solution (original control points) even though finding the optimal solution maybe hard (Section 13.7, Paragraph 2, Page 345).

Further, it is well known in the arts of Mathematics, Economics and Operations Research to simplify multivariate functions by selecting sets of points (control points) and generating one or more approximations for the function (section) based on the control points in that function as discussed above can be further extended to include approximations of the control points themselves. Such control point approximations would again reduce the complexity of the cost function approximations (section approximations) and the time and effort required to generate such approximations.

It would have been obvious to one skilled in the art at the time of the invention to implement or extend the apparatus and method for optimizing processes of Bayer et al. in view of the teachings of Tucker et al. and further in view of the official notice taken by providing a means for calculating the point of minimum cost for each section wherein one generates one of the one or more approximations for each set of control as a means of determining the best approximation for the section's cost function thereby

reducing the time and effort required to optimize the business process (Tucker et al., Page 76).

12. Regarding Claims 8 and 13, claims 8 and 13 recite similar limitations to Claim 3 and are therefore rejected using the same art and rationale as applied in the rejection of Claim 3.

13. Regarding Claim 4 Bayer et al. ('027) teaches a method and apparatus for optimizing business processes and a means for finding the minimum cost point of the cost function as discussed above.

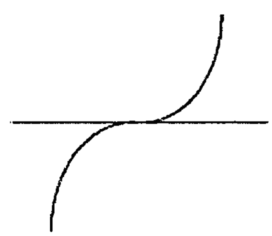
Bayer et al. is silent on finding a point of zero slope on the approximation as a means for calculating the minimum cost for each approximation as claimed; Bayer et al. teaches more sophisticated means for finding the minimum cost point.

Regarding Claim 4 official notice is taken that finding a means for calculating the minimum cost for each approximation wherein calculating comprises finding a point of zero slope on the approximation as claimed is old and well known in the arts of Mathematics, Economics and Operations Research as one of the simplest means for determining if a given point potentially represents a minima or maxima.

There exist a plurality of mathematical methods for determining if a given point is a local minima (calculating the minimum cost for each section). The zero slope criterion

as claimed is commonly referred to as the first derivative test. The first derivative test attempts to find a point along the function whose slope is equal to zero and then identify the point as either a local maxima or minima. More sophisticated tests for local and global extrema exist which could serve as alternative methods and provide a more accurate means of finding the minimal cost as claimed.

Further, the zero slope criterion as claimed has well known disadvantages including its inability definitively find a local minimum or maximum when one exists under certain conditions. For example the figure below depicts a continuous section of a function whose slope (derivative with respect to x) at the stationary point of inflection is zero but clearly does not represent a local minimum or maximum.



The zero slope criterion further deteriorates as the number of operational parameters (dimensions) considered increases leading to challenges such as the saddle point discussed above.

It would have been obvious to one skilled in the art at the time of the invention to implement or extend the apparatus and method for optimizing processes of Bayer et al. in view of the teachings of Tucker et al. and further in view of the official notice taken by providing a means for calculating the point of minimum cost for each approximation

wherein there is a means for finding a point of zero slope in order to reap the benefits of the simplicity such an approach provides.

14. Regarding Claims 9 and 14, claims 9 and 14 recite similar limitations to Claim 4 and are therefore rejected using the same art and rationale as applied in the rejection of Claim 4.

15. Regarding Claim 5 Bayer et al. ('027) teaches a method and apparatus for optimizing business processes and a means for finding the minimum cost point of the cost function as discussed above.

Bayer et al. ('027) does not expressly teach the means for calculating one or more of the approximations wherein the means for calculating comprises a means for calculating an interpolation function based on the control points as claimed.

Regarding Claim 3 official notice is taken that the use of an interpolation function as a means for generating one or more approximations thereby reducing the complexity of a function and the time and effort required to generate approximations is old and well known in the arts of Mathematics, Economics and Operations Research. Further such means are inherent in the definition of interpolation: calculating or generating points between ones that are known using the surrounding points or values.

It would have been obvious to one skilled in the art at the time of the invention to implement or extend the apparatus and method for optimizing processes of Bayer et al. in view of the teachings of Tucker et al. and further in view of the official notice taken by providing a means for calculating one or more of the approximations wherein the means for calculating comprises a means for calculating an interpolation function based on the control points thereby reducing the complexity of a function and the time and effort required to generate approximations.

16. Regarding Claims 10 and 15, claims 10 and 15 recite similar limitations to Claim 5 and are therefore rejected using the same art and rationale as applied in the rejection of Claim 5.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Earnest et al. (U.S. Patent 5,890,133) teaches a method and device for the dynamic optimization of business processing, the business processes being managed by a workflow management computer system.

Anbil et al. (U.S. Patent 6,035,277) teaches an iterative procedure for converging a Linear Program and yielding a value representing an optimal allocation of system resources.

Eric Weisstein (CRC Concise Encyclopedia of Mathematics) teaches definitions for Operations Research and Optimization theory.

Hughes-Hallet et al. (Applied Calculus) teaches basic techniques for finding maxima and minima.

Luc Moreau et al. (Optimization of Discontinuous Functions: a generalized theory of Differentiation) teaches a generalized theory of differentiation as applied to optimization and optimal control problems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott L. Jarrett whose telephone number is (703) 305-0587. The examiner can normally be reached on 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hafiz Tariq can be reached on (703) 305-9643. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SJ
10/6/2004

Susanna Diaz
SUSANNA M. DIAZ
PRIMARY EXAMINER
AU 3623